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- Onizawa, Takeshi,
Nippon Telegraph & Tel. Corp.
Tokyo 163-1419 (JP)
- Kumagai, Tomoaki,
Nippon Telegraph & Tel. Corp.
Tokyo 163-1419 (JP)
- Morikura, Masahiro,
Nippon Telegraph & Tel. Corp.
Tokyo 163-1419 (JP)

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(71) Applicant: **Nippon Telegraph and Telephone Corporation**
Tokyo 100-8116 (JP)

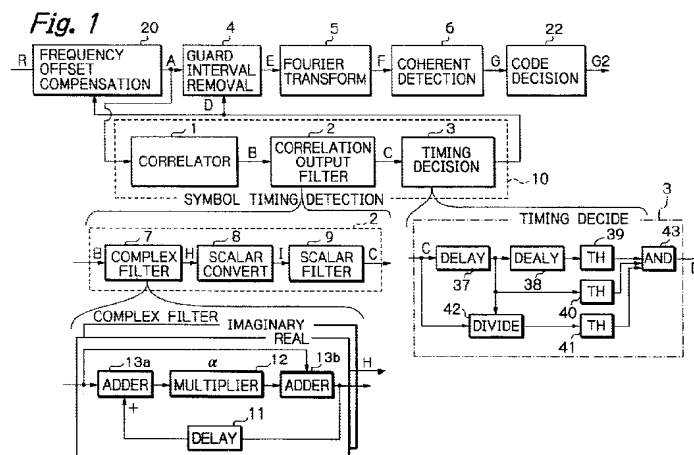
(74) Representative:
Skone James, Robert Edmund et al
GILL JENNINGS & EVERY
Broadgate House
7 Eldon Street
London EC2M 7LH (GB)

(72) Inventors:
• Mizoghuchi, Masato,
Nippon Telegraph & Tel. Corp.
Tokyo 163-1419 (JP)

(54) Synchronisation in multicarrier receivers

(57) A multicarrier signal comprises a short preamble, which is a periodic sequence. A receiver comprises a correlator, for the detection of the short preamble. The output of the correlator is filtered, to remove white noise. When the output of the correlator has exceeded a

threshold a given number of times in the period of the short preamble, and the correlation value then drops by predetermined amount, it is decided that the preamble has been correctly detected. The preamble is then used for frequency and symbols synchronisation.





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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	MIZOGUCHI M ET AL: "A fast burst synchronization scheme for OFDM" INTERNATIONAL CONFERENCE ON UNIVERSAL PERSONAL COMMUNICATIONS,, vol. 1, 1998, pages 125-129, XP002121851 IEEE, NEW YORK,US * figure 2 * * figure 3 * * figure 7 *	1,4	H04L27/26
Y	* Section IV *	9-11	
X	JP 10 294711 A (JISEDAI DIGITAL TELEVISION HOSO SYST KENKYUSHO:KK) 4 November 1998 (1998-11-04) * the whole document *	1,4	
A		2,3	
Y	EP 0 645 917 A (NIPPON ELECTRIC CO) 29 March 1995 (1995-03-29) * page 5, line 5 * * page 5, line 37 - line 46 * * page 7, line 30 - line 39 * * figure 1 *	9-11	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H04L
A	GB 2 325 125 A (BRITISH BROADCASTING CORP ;LSI LOGIC CORP (US)) 11 November 1998 (1998-11-11) * page 14, line 9 - line 10 * * page 15, last paragraph - page 16, line 8 * * figure 12 * * figure 13 *	1-4	
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		17 December 2002	Moreno, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant : taken alone Y : particularly relevant : combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date O : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/02 (1/04C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	EP 0 915 597 A (SONY INT EUROP GMBH) 12 May 1999 (1999-05-12) * page 2, line 18 - line 19 * * page 2, line 48 - line 52 * * page 3, line 7 - line 12 * * figure 4 *	5-8	
A	EP 0 901 256 A (SONY INT EUROP GMBH) 10 March 1999 (1999-03-10) * page 2, column 2, line 24 - line 31 * * page 5, column 7, line 16 - line 27 * * figure 6 *	5-8	
A	US 5 717 722 A (MORI TAKASHI) 10 February 1998 (1998-02-10) * column 22, line 40 - line 43 * * figure 23 *	9-11	
E	WO 00 77961 A (KIM KWANG CHUL ; SAMSUNG ELECTRONICS CO LTD (KR)) 21 December 2000 (2000-12-21) * page 2, line 5 - line 11 * * page 2, line 22 - line 27 * * page 3, line 6 - line 22 * * page 8, line 1 - line 17 * * figure 1B * * figure 2 *	1	
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		17 December 2002	Moreno, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 00 30 6027

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-4

Correlator output filter implementation

2. Claims: 1,5-8

Symbol timing decision circuit

3. Claims: 1,9-10

Carrier frequency compensation circuit

4. Claims: 1,11

Second preamble detection

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 6027

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-12-2002

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 10294711	A	04-11-1998	JP 2883866 B2	19-04-1999
EP 0645917	A	29-03-1995	JP 2643792 B2	20-08-1997
			JP 7087149 A	31-03-1995
			AU 672128 B2	19-09-1996
			AU 7295594 A	30-03-1995
			DE 69430785 D1	18-07-2002
			DE 69430785 T2	24-10-2002
			EP 0645917 A2	29-03-1995
			US 5440267 A	08-08-1995
GB 2325125	A	11-11-1998	EP 0877526 A2	11-11-1998
			EP 0876031 A2	04-11-1998
			GB 2361157 A ,B	10-10-2001
			GB 2325126 A ,B	11-11-1998
			GB 2325127 A ,B	11-11-1998
			GB 2325128 A ,B	11-11-1998
			GB 2325129 A ,B	11-11-1998
			GB 2325825 A ,B	02-12-1998
			GB 2326069 A ,B	09-12-1998
			GB 2326070 A ,B	09-12-1998
			US 6320915 B1	20-11-2001
			US 6317473 B1	13-11-2001
			US 6320917 B1	20-11-2001
			US 6205188 B1	20-03-2001
			US 6240146 B1	29-05-2001
			US 6137847 A	24-10-2000
			US 6130922 A	10-10-2000
			US 6320627 B1	20-11-2001
EP 0915597	A	12-05-1999	EP 0915597 A1	12-05-1999
			JP 11215097 A	06-08-1999
			US 6160821 A	12-12-2000
EP 0901256	A	10-03-1999	EP 0901256 A1	10-03-1999
US 5717722	A	10-02-1998	JP 8139779 A	31-05-1996
			JP 8139780 A	31-05-1996
			JP 8139781 A	31-05-1996
			US 5745535 A	28-04-1998
WO 0077961	A	21-12-2000	KR 2001002477 A	15-01-2001
			CN 1355971 T	26-06-2002
			EP 1188266 A1	20-03-2002
			WO 0077961 A1	21-12-2000

EPO FORM P0489

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82